THE COW & MILK BOOK

BY THE
HON. MRS. LIONEL GUEST

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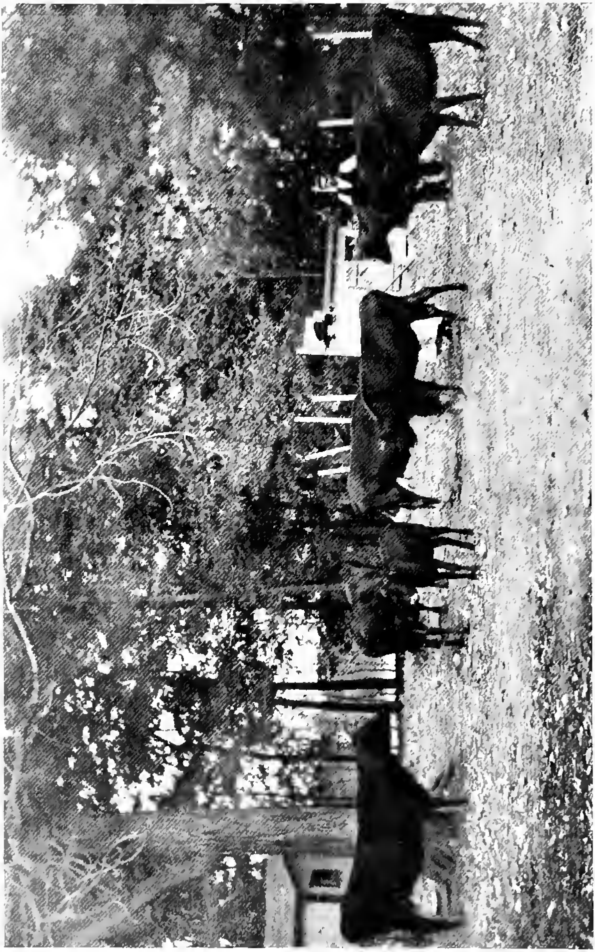

THE
COW AND MILK BOOK

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BY THE HON. MRS. LIONEL GUEST

LONDON: JOHN LANE, THE BODLEY HEAD, W
NEW YORK: THE JOHN LANE COMPANY
TORONTO: S. B. GUNDY: MCMXVII

374100

Printed in England by Butler & Tanner, Frome and London

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PREFACE

ON September 8, 1916, when my book was already in the press, a most significant interview appeared in the *Daily News* with Sir Thomas Mackenzie, the present High Commissioner for New Zealand. As a former Minister both of Lands and of Agriculture in that country whose efforts to eliminate disease in milking herds were attended with conspicuous success, Sir Thomas speaks with peculiar authority on the subject of the milk supply, and by the kind permission of Mr. A. G. Gardiner, Editor of the *Daily News*, and of Sir Thomas Mackenzie himself, I am permitted to quote this interview in full, for I feel that my book could have no better preface.

"Sir Thomas, who emphatically disclaimed all intention of instituting invidious comparisons between conditions in this country and New Zealand, observed that he would not discuss the question at all were it not that some of the New Zealand soldiers under his care had been exposed to risk by reason of affected milk having been supplied to them.

"'I cannot help feeling astonished,' he continued, 'at the apparent indifference in this country to the importance of setting the milk supply above suspicion, or at any rate of the lack of effective measures to that end. Take the question of tuberculosis alone. I happen to be interested in a certain institution in one of the Home Counties which I visit from time to time.

"'Not long ago I heard that two or three members of the staff and patients were showing slight but distinct signs of tuberculosis. I inquired whether the milk supply was satisfactory, and was assured that it was irreproachable, and the local inspector, I was told, gave his assurance also. Nevertheless I had the cows tested, and found that no fewer than eight, out of, I think, thirty-two, were tuberculous. I insisted that the dairyman should purify his herd, which was done, and when I asked if the cows had been destroyed was told they were merely sold off and taken away to another district, where, of course, they would give infected milk.

" 'Exactly the same thing happened in another case I could quote, and I found on inquiry that it was the custom to sell diseased milking cows in the open market without any guarantee being given. The elimination of tuberculosis in the herds cannot be too seriously dealt with. In order to purify our stock we in New Zea-

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"'A source of infection is often the skimmed milk and whey which is sent from the factories to feed young stock. Now we work so largely on a system of co-operation that measures to deal with this aspect were easily arranged. The farmers united with the Government in providing an effective system of sterilization. We experimented and the results were most satisfactory. By such means we keep our herds pure. I might say that owing to the purity of the food in our country the average life of our people has increased by five years. Every animal that is exported has attached to it a certificate of absolute freedom from all disease, and that certificate can be relied upon.'

"Sir Thomas Mackenzie is impressed with the importance of breeding for an improved milk-yield. At present, he pointed out, one of the probable causes of dear milk was that numbers of the cows did not really pay for the cost of their keep, though often the owners failed to realize that, through keeping no systematic account of the value of the yield of the individual cow.

" 'When I have been looking at cows at markets or agricultural shows,' he observed, 'I have almost invariably found that their owners could give no definite information at all as to their milk-yield. What I want to know about a cow is the quantity of its yield measured in gallons and the quality measured in butter-fat. Again, in the case of a bull, I care much less about the ordinary pedigree than about the milk record of the stock it comes from.'

" Dwelling on the importance of Government initiative in the matter of inspection and the improvement of breeds, Sir Thomas pointed out the obvious objections to leaving such matters in the hands of local bodies, such as County Councils, which almost inevitably tended to see through the farmer's eyes rather than the community's. He is entirely in favour of the institution of municipal milk supplies, but considers that the work of inspection and supervision on the farms is best handled by the Board of Agriculture.

" 'Let the municipality begin where the central authority leaves off,' he counselled : 'it matters comparatively little exactly where that line is drawn, so long as between the two authorities the whole ground is covered. What is essential is that the vital importance of the milk supply to the national physique should be adequately grasped.' "

THE COW AND MILK BOOK

FARMING

THERE are a great many people to whom the war has meant a sudden awakening to the question of our national food supply. The cry of "back to the land" has taken on a new meaning, and successful farming appears in the light of a national service. This is as it should be, and the more people who are attracted to farming for patriotic reasons the better. They are far more likely to make a success of it than the people who take it up as a last resource after they have failed at everything else. Farming takes brains, and it is the greatest possible mistake to teach the children in our schools in such a way as to lead them to suppose otherwise. Practical ability finds its chance in the country as well as in the town, and the better a farm is run the more likely are the children brought up on it to look to the land for their livelihood.

It is also well to remember that there is much more money to be made out of two, three or ten acres scientifically managed than out of twenty acres run with only labour enough for ten and not enough brains for one. Too many people go in for big ranches in the colonies who could make more money at home on a few acres if they would work equally hard and use common sense, for there is a magnificent and growing market at our doors in all parts of England.

The way to make a profit on a place is to keep no more than you can keep in the best way. It pays over and over again, as I have proved, to treat farm animals more like human beings. The more care and attention you give them, the higher will be the rate of interest at which they repay you. Young animals are much like children, and if they are frightened or nervous they get thin and sick and their general intelligence and usefulness are impaired. That is why I think women should make more of a speciality of the livestock upon a farm and be better paid for their work than they are at present. They naturally have an instinctive maternal knowledge about the health and welfare of young animals and the patience with them that men often lack.

Damp, dirt and darkness all spell disease and death, and if we would only build and run our houses and farms more on the lines of an open-air sanatorium, we should prevent the tuberculosis we now spend so much money and time to try and cure. Especially is this the case with regard to cattle, and it is impossible to lay too much stress upon the need for cleanliness, light and air, in all matters relating to the care of cows and dairy produce.

How can we expect to stamp out disease in cattle that are kept in dark, damp stables lying on wet straw and turned out in a small farmyard which is mostly a series of puddles of rain and urine? True, the pastures will often be wet and the cattle often be rained upon, but if they are to be healthy and happy, they must have light, dry, well-ventilated barns. I am convinced that the female especially, in all animals as well as human beings, must have some place where she can get and keep her feet dry and warm when she wants to.

BEEF *versus* MILK

BUT the farmer who rears cattle is confronted with this problem: is he to look to the butcher or the dairyman? In other words, is he to sell his cows for beef or to depend upon their output of milk for his main profits? The question is one that has become far more acute since the war. The price of meat has become high, and the man on whom the present shortage of labour presses heavily is strongly tempted to kill his herd for beef and incidentally to sell his hay and other forage crops at their enhanced values rather than struggle on against the daily difficulties of dairying. His position is one that commands sympathy, but at the same time it would be a most deplorable thing if there were anything like a milk famine in the country. The supply has undoubtedly been short. The figures of infant mortality are appalling. It is impossible to avoid seeing at least some connexion between these two facts, and therefore I would say most emphatically that in any question of beef *versus* milk, it would be far better that we should become a nation of vegetarians than that our babies should be deprived of one pint of their proper sustenance.

To secure a continuous and adequate supply, I should like to see greater attention paid to the heavy milking breeds. Many farmers go in for the general utility cow, hoping both to secure a fair amount of milk and to be able to sell profitably for beef. In my humble opinion this dual purpose beast is a mistake and bad business. Cattle should be raised for one thing or the other: milk or beef. And for this reason. The cows that produce most milk are not only of a different breed from those that produce the best beef, but their whole form and temperament are different. There is no doubt that, in a pure-bred animal, function governs form and temperament governs both. Take a cow like the Hereford, bred mainly for beef. Its temperament is essentially phlegmatic. It is solid, straight and heavy, closely knit, a rectangular block of flesh mounted on four legs. Contrast with this a typical dairy cow, an Ayrshire or a Jersey, and remember that the functions of motherhood draw heavily on nervous energy. This cow has motherhood written large all over her, and her temperament, like that of a racehorse or a hunting dog, is wholly nervous. She is thin, rugged and actively built, her spine has large recesses, is loosely hung and affords a roomy channel for the transmission of nerve power from the brain.

It seems to me impossible to combine the beef and the dairy temperament in a really profitable way, and in writing this little book I have had the dairy cow principally in mind.

THE CARE OF MILK

WHEN we come to think of it, we are dependent upon milk in one form or another at every meal. It is, with raw eggs, possibly the most important of all articles of food for the young, the aged, the sick, and yet there is possibly less understanding of milk and its care than of any other food.

We know good food in a restaurant and pay accordingly, but the price of milk is always standardized, whether it is good or bad. This seems to me very unjust and would not be tolerated if the public knew the difference.

Most of us have seen on the milk routes

in London milk in tins with a dipper hanging on the side, for all the dust and filth and bacteria of the streets to blow into and stick to it. The dipper is then used to scoop up the milk delivered at each house. The man's hands are bound to get milk on them, and this dries sticky as every one knows. Yet these hands, without any washing, handle the milk during the entire route. Every time the dipper is used, the milk is put in motion, and there is also the motion of the cart, which engenders heat independently of the outside air. It is no wonder that within a few hours the milk has a smell and a taste which the cow never gave it, with every sort of foreign bacteria fighting in it. This is far worse than the negligent way in which our bread is delivered. When all milk is brought to our doors in sealed bottles and all bread in oiled paper, we shall have some little claim to call ourselves a hygienic nation.

Milk is distributed three times a day in London, apparently because people who know nothing about it have an idea that it will not keep fresh. It is quite true that milk will not keep fresh—

1. If it is milked with dirty hands from dirty cattle in a dirty stable and kept in dirty vessels.
2. If it has been shipped warm.
3. If it is constantly disturbed by being dipped out from one large vessel.
4. If the cook is so ignorant that she leaves it uncovered in a warm kitchen where it absorbs all the fumes of cooking and any dust there may be about.
5. If left in a cupboard with meat, fish and vegetables.

But milk from clean cattle, milked

by clean people in a clean stable, instantly chilled and bottled in properly sterilized bottles, and on its arrival kept in a cool place, covered and undisturbed, should keep absolutely fresh for twenty-four hours, and I have known it in cool weather keep for forty-eight hours and be delicious, without any preservative or even being kept on ice.

There is a great hue and cry about the price of milk, but I wish there were more about its quality and its care. I suggest that we could be fairer to the milk dealer if we who bought and used the milk understood the reception and care of it better. Remember that in addition to the elementary precautions given above, all milk vessels should be rinsed out with cold water immediately after being emptied. This is a service to the dairyman as well as yourself, for it is very much harder to clean a can that has been left unwashed for several hours.

In very hot weather either stand the milk on ice, or put a wet flannel around the bottle so that the evaporation will keep it cool.

If your milk is in an open pitcher put a damp flannel over the top as well as round the sides. This will keep out odours and dust.

If you have nowhere very suitable for keeping milk apart from the rest of the food, further precautions should be taken. As soon as it is delivered and before exposing it to the air at all, pour the milk into a saucepan, pot, kettle, or fireproof pitcher kept for the purpose, and bake it for about half an hour in the oven until it begins to bubble up, or put it on the back of the stove to simmer for not less than twenty minutes: either method will render the bacteria fairly harmless. Rinse a clean earthenware pitcher with cold water and pour the milk very slowly into it while still warm. Cover with a clean cloth to exclude dust and leave it to cool naturally. The heat of the room or thunder weather will then be powerless to turn your milk. I used this method in Canada as soon as the milk was skimmed, not only to preserve it, but to thicken it by evaporating the water. This reduced the quantity but improved the quality of the skim milk.

THE PRICE OF MILK

A GREAT deal of the commotion about the price of milk seems to me very unjust to the farmer. To produce good milk costs money. It is, however, absurd that all grades of whole milk should be sold at a standardized rate, and I have already tried to make it clear that a better understanding of milk and its care would do away with this anomaly.

It seems to me that the price of milk can only be really lowered—

1. By keeping only those dairy cows that yield over 4,500 lb. of milk a year and breeding only from them and

a pure-bred bull not for show but of milking strain. It costs no more to feed a good cow than a bad one. It takes no more time to keep her clean and she takes up no more room in the stable.

2. By reducing the terrible mortality among calves by more care in raising them.
3. By feeding the cattle with lucerne or alfalfa and ensilage and thus enormously reducing the cost of their keep.
4. By delivering milk once a day only, thus reducing labour. I have already shown that it will keep sweet with proper care, but the bottles should be labelled with the day of milking.

HOUSING THE CATTLE

A COWSHED should, if possible, face south, and be amply provided with windows, but free from draught. If you are building a barn for a number of cattle, try to place them with their backs to each other, with a broad cement walk down the centre, and gutters 8 inches wide by 4 deep on each side. If they are facing one another, they breathe in each other's faces and the danger of any sick cow infecting the whole herd is enormously increased. There is also the danger of draught on their backs from the windows. There should be a passage way in front of the stalls to facilitate feeding, and the floor of the stalls should have a very slight slope towards the gutters and if possible be grooved so that the moisture may the more readily trickle away. To keep the bedding dry and clean is half the battle. If the slope is too great, it is bad for the cows, and it is always a good plan to put more bedding under the hind quarters to relieve any possible strain.

I should also plan a hospital with a box-stall in which to isolate a sick cow, and two or three more for cows calving, so that they may have their liberty to dry and clean their calves and to move about freely while they are in labour. The sick ward and the maternity ward should be quite separate, so as to run no risk of infection.

See that the gutters are all deep, and broad enough to take the broom. They should lead into a manure tank, as all liquid manure is most valuable and should not be allowed to soak away into the ground or to be diluted by the rain. At Allancroft, fifteen miles from Montreal, the gutters are controlled by valves, so that the waste water used in washing and swilling runs elsewhere is not allowed to decrease the strength of the manure. The more solid manure should also be under shelter. Shovel it into a barrow and wheel it daily to the manure pit. This must not be so close to the cowshed that the cattle will breathe the tainted air.

I shall refer again to manure as part of the farmer's capital.

Ventilation

The more light and air you can get into your cow stable the less chance have germs to breed in it. The King Ventilator System of windows is admirable and has been adopted in many hospitals. These windows open inwards at the top without hinges and can be slipped right out of their iron sashes, and thoroughly washed and disinfected in every corner. Window ventilation is, however, not enough, and a ventilating shaft bringing the cold air in at a height of 4 or 5 feet from the floor will act well in conjunction with air shafts in the roof.

Fittings

The manger racks, if of wood, should be thoroughly limed and disinfected every few months, but preferably I should have all stanchions and racks of metal, cement or stone.

WHITEWASH

UNLESS your cowsheds are tiled, whitewash the interior two or three times a year, spraying thoroughly into all cracks and corners. Two thin coats of whitewash are better than one thick one, and the following is a good recipe: Add sixty parts of water to 100 parts of unslacked or quick lime, and to every quart of this mixture add four quarts of water, diluting even more if necessary. It will be more effective as a disinfectant if applied hot, and also if one pound of chloride of lime or bleaching powder is used in each three gallons of whitewash. For exterior work the following, which is known in America as "government whitewash," may be highly recommended. Slack half a bushel of lime in boiling water, covering the vessel to keep in the steam. Strain and add a peck of salt previously dissolved in warm water, half a pound of Spanish whiting, three pounds of ground rice boiled to a thin paste and stirred in while still hot. Dissolve a pound of glue by soaking in cold water and then hanging it over a slow fire in a glue pot. Add this to the mixture, and also five gallons of hot water. Stir all well together and leave it to stand for several days, covering it from the dust. It is best applied hot. Spray nozzles for whitewashing can be obtained from most ironmongers, and should give satisfaction.

Creosote is, of course, an excellent preservative of wood, and the following milk paint is also invaluable for resisting bad weather; its essential feature is that it sinks into a rough surface and hardens there like stone, not soluble by storm, cold or heat.

This paint is composed of Portland cement and sweet milk mixed to a consistency that will spread readily on the rough board. It is the most durable and cheapest of all covering materials; a little white linseed oil or a little white lead may possibly improve it, but neither is indispensable. You can leave it the natural drab colour of the cement and milk, or use a colouring of yellow ochre, toned down by white lead or blueing. A bushel of cement will go a long way.

This mixture hardens when made, so it must be mixed fresh with new milk every morning, enough for one day's use only.

HOUSING CALVES

THE dark sheds where calves stand and sleep on damp earth with only a little straw on top are very false economy. You would not expect a baby to thrive in a cellar without light and air, so if you are adapting any buildings for livestock remember that an old greenhouse is better than a coalshed.

The ideal way is to have a field with a well-ventilated and glass-fronted shed of a size proportionate to the number of calves. The glass must, of course, be high enough for the calves not to break it, or it must be thoroughly protected by stout wire netting. This should face south and be a regular sun-trap, and it should also be raised a foot or preferably more off the ground. Next to this an open or wire-fronted shed, also raised from the ground and facing south, will be much appreciated as a play-yard in bad weather. This is precisely the same idea as the modern laying-house and scratching-shed for poultry, and it is well worth while.

I confess that my animals taught me more than I taught them, and the notion of an open play-shed for calves was given me by a young calf I had who used to find her way into the glass-fronted chicken-house and lie there in the sun to get warm and dry. If the calf-shed is at the end of the barn, the same principle may be followed. Keep the calf-sheds off the ground and give plenty of fresh, dry bedding and enough space for them to run around and play in. Iron rails make the most sanitary calf pens, but wooden ones do very well if whitewashed and disinfected periodically. I am a thorough believer in calves being turned out for a run every day of the year if they have somewhere to come back to where their feet and stomachs can be kept dry and warm. Cattle and poultry are very much alike in this respect, and there is a great difference in the milking quality of a cow if she has been well nourished and cared for as a calf, before and after birth.

TO START A HERD ON ECONOMICAL LINES

ONE of the great charms of dairying lies in building up your herd. There are many ways of starting it. Some people take calves and raise them, and this, though good, takes rather a long time. Others buy fresh cows in full milk and sell them when they get dry again. This method, if you can call it such, is really criminal, for it means that no record is kept of their production, and therefore cows of good milking strain that would be most valuable to breed from are sold indiscriminately to the butcher. Moreover, you do not know if you are bringing disease into your herd or not, and you do not get to know your cows thoroughly. It always takes a little time for you to understand an animal, and for the animal to understand you, and you never get the best from a cow until she knows that you will do the best for her. Then again many people spend a lot of money on heifers just coming into their most valuable period of lactation, but the most economical way of starting a herd is to buy old pure-bred cows of powerful milking strain, for a comparatively small sum, and to raise calves from them. Such was the advice given me in Canada by a very successful dairy farmer, and I therefore bought a French Canadian cow that was twelve or thirteen years old, with a record of 70 lbs. (7 gallons) of milk a day, which she had kept up pretty steadily for several years. She was no longer in her prime, and had lost many of her teeth, but she gave me three or four very valuable calves, and when I sold her she was in calf and fit to start another herd, though not giving more than 30 lbs. of milk a day. I can therefore heartily recommend this method, for I followed it for several years, occasionally buying young calves as well from stock I wanted to breed in with my herd. If you cannot afford to start with a cow whose record is over 4,000 lbs. (400 gallons) of milk a year, have her put to a bull that comes from a record milking dam. Milking capacity is transmitted by the sire, and his daughter will outdo her dam and give you the foundation of a good milking strain. Many a man has started with a 4,000 lb. record and in a few years has worked it up to 10,000 lbs. by breeding from a thoroughbred bull of good milking strain, thus increasing his profits by 150 per cent.

On my island in Canada we were a family of four, with six servants. We had a pitcher of milk on their table as well as our own every evening; we made all our own butter for the table and for cooking, and sold a few pounds every week. I had one or two regular customers who bought whole milk from me all the year round, and I raised my calves, fed two pigs and over a hundred and fifty chickens on skimmed milk always once a day. When I first started my herd, it took six cows to produce what I required. Just before we came to live in England it only took three. These cows were French Canadians, or Quebec Jerseys, a very hardy and gentle breed. I sold every cow with a guarantee for two months of what she would produce, and I promised calves latterly before they were born on the record of their mothers.

This is the advantage of breeding thoroughbred cattle from blood you know something about, and is, I think, in the end the most profitable and satisfactory way of working up a dairy herd.

ADVANCED REGISTRY OF CATTLE

IN Canada an advanced registry of cattle is kept by the Government. Only pedigreed stock of a certain standard of milk production and a certain percentage of butter fat are admitted, and once admitted they are liable to Government inspection and the Government keeps a record of the milk produced. The farmers are all keen to get their cows entered, since they naturally bring a high price when sold with a Government certificate, and their progeny are doubly valuable.

The Advanced Registry unfortunately does not yet obtain in England. Its nearest equivalent is in the Milk Control

Societies which keep a record of the milk of every cow entered on their book, and what it costs to produce the milk per gallon.

HOW TO CHOOSE A DAIRY COW

A GOOD dairy cow is only a machine which churns into milk the food put into her stomach, and a good milker is always thin. The cow which uses her nourishment to cover her own bones is not any good as a milker, so pick out a cow that is not inclined to put on flesh, and with rather a slim ewe neck and prominent eyes. You want an animal that can consume a lot of food and pump a lot of blood. See, therefore, that she has plenty of room between the ribs and the pelvic bone, and that she is thick and deep through the heart. The hind-quarters should be broad, so that when you stand in front of her she should appear almost wedge-shaped. The hide should be loose and elastic. Pluck it up between your finger and thumb to see that this is so. Examine the spinal column and see that the vertebræ are not knit too close together but are rather loosely hung. A very long bone to a cow's tail usually denotes a good milker. The bag should be shorter in the front than at the back and should come up very high between the hind legs. Examine the milk veins under the stomach. The bigger they are the better. Do not buy a cow that has more or less than four teats, as any blemish to the bag is apt to affect the milk and cause difficulty in milking. Physical blemishes are also likely to be inherited. Avoid a cow with a drawn face and a dry, feverish nose. The muzzle should be moist. Avoid a cow that runs at the eyes and has a short cough or stands with her head hanging. Tuberculous cattle, like tuberculous people, get a very pinched look in the face which can be quickly detected. Sometimes a cough is brought on by dust in the hay or weevils in the dry food, but if this is the case, a good drink of water should relieve and cure it.

THE BULL

A VIRILE bull should have a short, thick neck and be broad between the eyes, with a very straight and well-knit back.

Naturally every breed has its special points, but the main thing in every breed is for the bull to look healthy and strong, and for his physical points to be in direct antithesis to the good physical points of the cow. Avoid buying a bull that looks like a cow, or a cow that looks like a bull.

STALL-FED COWS

ALTHOUGH stall-fed cows have done very well in Denmark, I cannot believe the system of keeping cattle indoors all the year round can be a healthy one for more than one or two generations at the outside. I have no statistics to quote, but have observed the different methods people have of running their farms. It is against nature for a woman not to move about and particularly in the suffering of childbirth. The cows that survive this treatment of never being allowed out of doors may give a trifle more milk, but their chances of tuberculosis and milk fever are increased ten-fold, and there is also the great risk of the calves being stillborn. The reason that the intensive system has ever been advocated, is, I believe, mostly because the other extreme of keeping cows out all the time in a cold, damp, and rainy climate is also very bad for them and certainly decreases the milk flow; but surely there is a happy medium. Common sense suggests that the cow, like a woman or a hen, can stand wet while she is moving about, but must have a place to dry her feet and a dry place to sleep.

BEDDING

THICK, dry bedding is most important for all cattle, whether calves or cows, and especially when they lie on a cement floor, as the mammary organs may otherwise be chilled. There are a great many litters all equally good, such as straw, chaff, sawdust, shavings and peat moss. See that the manure is removed twice a day. It is better economy to do this than to be constantly changing the bedding. It is impossible to overstate the importance of clean, dry litter as a preventative of scours, tuberculosis, garget, and foot disease.

WATERING THE CATTLE

ALWAYS give your cattle plenty of good, clean, fresh water to drink, and discourage their drinking from puddles in the barnyard. Put lump rock salt in the pasture and stable to increase their thirst. The more they drink the better. Water them three times a day, but do not leave either water or food standing in the cowshed after they have finished. The water given them in the winter should have the chill taken off, as very cold water diminishes the milk flow.

FLIES AND LICE

COWS that are irritated instantly go off in their milk flow, and more often than not this is caused by their being bothered with flies. To keep flies out of the cowshed, wipe off the window sashes and doors with crude oil during the fly season.

An excellent way of keeping these pests down is to enclose a few growing hens where they can have access to the manure heap, as they destroy the larvæ. This is cheaper than destroying them in any other way. You will notice fewer flies around a barn where fowls are kept than where there are none, but it is not advisable to let the hens live in the barn with the cows, as there is always the danger of lice getting into the bedding, and it is no joke getting lice off cattle if you once get them on. That is why, after a severe lesson in Canada, I used to give my cows a good brushing with kerosene or crude paraffin to discourage both lice and flies. This has rather a strong smell, but cleans the coat beautifully if brushed on with a stiff, hard brush, and leaves the animal as sleek and glossy as a race-horse. It will not affect the taste of the milk unless you get it on the bag. In the winter my cattle were always brushed with this once a week to guard against the risk of vermin, but in the autumn when the flies were specially persistent, I sometimes used a quart of zenoleum or whale oil, with a quart of raw linseed oil. To this I added twenty-five quarts of water and put it on with a sprayer. It was rather sticky, but kept the flies off for several days, when it was renewed. A dusting of powdered sulphur after the spraying is also a good plan.

RATS

TO keep rats from under barns and cowsheds, collect as many old bottles as you can get and spread a good thick layer of these under the floor, breaking them with a hammer into fairly small pieces. Rats, after cutting themselves a few times, advise their families and friends to find another home.

COWS CALVING

DO not let a cow calve until she is over two years old. In other words, do not put her to the bull until she is over fifteen months old. A heifer often comes in heat when it is about four or five months old, and a healthy cow should come in heat every three weeks and remain so for twenty-four or thirty-six hours. After bearing a calf she becomes in heat again in about four weeks. A cow carries her calf for nine months, or an average of 285 days. The milk she gives for fifteen days before and a week after calving is not fit for human consumption and it should be illegal to sell it. Give it to the pigs, chickens or dogs and to the calf when it arrives. It is really best to dry the mother off for a month before calving, for the farmer who tries to keep a cow in milk all the year round is stimulating the cow at the expense of the future. However heavy a milker she may be, in two or three years' time she will not be able to give the same amount of milk. Also if she is giving very little milk for two or three months before calving it pays better to dry her off, as she will then need less food and the chances are she will give more milk again when fresh, and your year's record will be higher.

Some cows are very difficult to dry off, but this can generally be effected by giving very little water to drink, and no sloppy food, only grass or hay, and possibly a few roots.

Do not make the mistake of starving

a cow while dry if you want the calf to be very good, or the cow to have a good milk flow when she freshens again. If she is dry in summer, pasture is enough, but in winter it is best to give her a little soft feed as well as hay until she calves.

It therefore pays very much better to have your cows calve in the autumn. Their milk supply is stimulated by the soft winter feed and, as the farm hands are less busy than in the summer time, they are able to give more attention to packing away the salt butter that you intend to keep. Then when the cattle are turned out in the spring they get the fresh young grass, and the pasture should be sufficiently good to carry them through the summer.

See that a cow has abundant exercise before calving, and let her have her liberty in a loose box so that she can move about freely while in pain. This lessens the danger of milk fever and retained afterbirth. As soon as she has calved, give her a bucket of warm water with a handful of bran thrown in to drink at once. Put a blanket over her for the first day or two and see that she is not in a draught. Let her dry her own calf by licking it freely, and leave the calf to draw off the mother's milk for twenty-four or forty-eight hours. For the first three days feed the cow very lightly with thin warm bran mash and hay, and after the calf has been taken from her, only milk her enough to open the teat and prevent the udder from swelling. On the third day, but not till then, all the milk should be drawn and given to the calf, as it contains an aperient for the calf's bowels which no artificial feeding can replace. As the calf will probably be unable to drink it all, give the rest to the pigs or chickens, but do not use it in the house.

If the cow has a great quantity of milk and is a good feeder, milk and feed her three times a day for the first three or four months. This stimulates the secretion of milk and she will prove much more profitable. Nature regulates the supply to the demand, and if the calf remains with her she will produce only what the calf needs. Therefore, by taking the calf away and milking the cow three times a day, stripping her thoroughly each time, and feeding heavily, you artificially increase the milk supply.

ON RAISING CALVES

THE only way to stamp out tuberculosis is by more careful raising of stock, so if you want your herd to be free from this taint, see that the calves get a fair start in life. Like children, they need sun and air, dry feet and lots of play.

Take a calf away from its mother twenty-four or forty-eight hours after birth, and put it in a loose stall where she can neither see nor smell it. You can put several calves together provided they are about the same age, but a difference of two or three weeks will often prove fatal. I once had a bull calf not six weeks old so injure a little heifer calf of a week old by butting and playing with her that she died.

Milk the cow three times a day for several weeks, giving the calf whole warm milk. Nothing equals a six weeks' start of feeding with milk three times daily. It is better for veal and better for dairy cattle. About two quarts at a time are enough at first. The milk from one cow should be enough for six calves. Give it at the temperature of the blood. This helps to avoid scours or diarrhœa. After four or six weeks begin gradually to give the calf skim milk twice a day, slightly warmed and mixed with oatmeal gruel, linseed, or calf meal. These are very nourishing and fattening substitutes for the mother's milk. I have used them all. Whey has about half the feeding value of skim milk and may be used in succession to it, making the change gradually. Give good sweet whey and mix the calf meal with it carefully. Allow six lbs. to a calf for a feed. In feeding the calf, hold the bucket up ; it is natural for a calf's digestion to swallow with its head up, not down. Be careful that the buckets are washed directly after feeding. Do not leave anything standing in them to go sour and taint the next meal, and see that the milk is not scalded or very hot. It should only have the chill taken off it. If the milk is too hot and the calf improperly fed, it will get a harsh coat with the hair standing up.

At this age you may also feed calves with a little oats from your hand afte they have had their milk. Rub it on their muzzles ; it will tickle them and they will soon learn to lick it off, chew and like it, thus accustoming the stomach to digest rough food while young. Let them also have hay to nibble at as young as possible. The sooner they learn to take it the better. The cow, as I have said, is a machine, and the more food it consumes and digests the more work it can do. Therefore, as calf and cow, its liver should be kept in good order and all organs in a healthy condition and free from nervous irritation of any kind. No process that milk can be put through takes the place of fresh milk from healthy and happy cattle. We see all sorts of advertisements of dairies and I wonder why we have never seen one about happy cows raised from happy calves.

The well-nourished calf is practically bomb-proof against disease, as long as it has plenty of exercise, sun and air. I have already dealt with the ideal way of housing it, but should like to dwell again upon the importance of sunshine. I know of a man who made a small fortune out of buying calves from condemned cows and raising them in a greenhouse all the winter. Every one got well and passed the tuberculosis test. Naturally they got out into the air every day for a short run and the greenhouse was thoroughly ventilated.

In Canada I always turned the calves out for a run in the sun as soon as they were ten days old, for fifteen minutes to half an hour in the winter and longer in summer. I even dropped them in a small snowdrift, so that they got exercise in struggling out again. As soon as they were a month old I left them out day and night in the hot weather, except in rainstorms, giving them plenty of shade and water.

Never let calves stand in damp stalls

or wet manure. The calf pens should be whitewashed with lime and carbolic, and droppings removed three times a day. This saves the litter, but see that there is always plenty of dry bedding. A wet stall is one of the most frequent causes of calf scours.

Have your calves brushed every day with a clean stiff brush. It stimulates the circulation and helps their digestion as well as their looks.

It is dangerous to keep bull calves with heifers after the former are six months old. A bull is fit for service at a year old. Put a young heifer to a young bull, rather than to a big mature one. The latter practice is dangerous, and may lead to serious injury to her spine.

A CRÊCHE FOR CALVES

THE present enormously high mortality among calves is very largely due to damp, dirt and darkness. Many farmers are very good dairymen, but have no idea how calves should be raised; and many kill their calves for veal merely because they cannot be bothered with them, and do not care to take the chance of having them die after the first few weeks of trouble.

I am often surprised that no one has started a nursery for raising calves, particularly during this food crisis, when it is so important that young stock of both sexes should be reared to maturity. If you have the intelligence to raise two or three, you can, with proper calf sheds, equally well raise two or three hundred. Would it not then be a good idea to have some place where a farmer could send his calf when two or three days old? He might sell it outright to the nurseryman, or brand it and retain the option of buying it back in three months, six months or a year, at a price fixed according to the value of the calf. He would thus be enabled to build up his herd and keep his own stock without the trouble of raising two or three calves. But if the farmer did not turn up to claim and buy back his calf the man who ran the crêche would then have the right to keep or sell it as he wished, rather on the principle of a pawnshop.

I believe that children, properly superintended, would be invaluable for this work. I always found them remarkably efficient in Canada. Of course they must be properly remunerated, but they would reduce the cost of labour, and the advantages of bringing up children on a farm are innumerable. It gives them an interest in the country which cannot be over-estimated, and in dealing with real things they learn a great deal more of the sacred laws of animal and vegetable life than those whose pleasures are entirely artificial. They are delighted to be of use, and work if properly presented appeals to them as a new and desirable game. They naturally love young things and their responsibility for them develops the root of responsible parenthood.

I can quite understand that farmers living near big towns do not care to raise calves, as the milk trade is their main source of profit, but I believe that, with the very high price of cattle of one and two years old, farmers in the more inaccessible parts of England and Scotland could make an ample living by raising calves on the lines I have indicated.

HANDLING THE CALVES

ON my island in Canada I began when the calves were scarcely a fortnight old to lead them about with a collar and chain. They ran around with me like dogs on the lead, and the only time I had any difficulty in making them follow me was when it was meal-time, as the internal clock of all farm animals is particularly accurate. It is a great thing to accustom them young to be tied and led, for otherwise it is difficult to get them to move from the place to which they are accustomed when they are taken to be sold or served or pastured in a new field. The habit of beating them, shouting at and frightening them and twisting their tails is not only bad for the milk, but bad for the disposition of the cows, and wastes the time and patience of the person driving them.

The savage qualities of a bull depend largely on its early handling. Some breeds are naturally more ferocious than others, but I have frequently in Canada seen bulls used for farm work. Mr. T. B. Macaulay's beautiful bull, Prince Elegant II, used to be harnessed to a wagon to take the luggage to the station.

WASHING CATTLE

THERE is a good deal of controversy as to the desirability of washing cattle or not. But cows will always go into the water to cool themselves off and often swim to better pastures, as I know to my own annoyance and that of my neighbours in Canada. I always used to wash my cows two or three times during the hot weather with warm soap and water, afterwards brushing them with a hard brush until dry.

If they have to be kept in a good deal during the winter, one cannot over-estimate the importance of brushing, dipping the brush occasionally in crude oil.

DEHORNING

I DO not care much for dehorning cattle, but have done it a few times when the cow was a cross one. Clippers seem more humane than a saw and cause less bleeding. After removing them apply cotton and tannin to the stumps and cord the animal's head. Lay a piece of twine over the top of its head, between the horns and down the face, then pass another cord around the base of both horns and tie as tightly as possible. Tie the first cord to this. It will tighten the cord around the horns and stop the flow of blood immediately. Cut this cord the next day, but do not remove it, as pulling it off sometimes starts the bleeding afresh.

Dehorning does not affect the milk flow for more than a few days. Its chief advantage is that you can handle a herd of cattle with greater ease and safety. There is also an instrument for dehorning calves.

MANURE

REMEMBER that the profit in a cow is not only in the milk or butter you consume or sell, but in the manure which feeds the land and makes it every year more fertile. Manure is working capital and should be valued as such, for the nitrogen it contains is most valuable to all plant life. It has been calculated that £20 worth of clover hay contains £17 worth of plant food, and if this is given to cattle three-quarters of the plant food is returned in the manure, only the smallest fractions being traceable either in cream or butter. If your hay is sold therefore, your ground loses all this fertility.

There is also the manure from the cowsheds. I have already suggested how this should be dealt with from the point of view of keeping the cowsheds clean, but I should like to emphasize the fact that every ounce of manure, solid or liquid, is precious. It should be kept apart, and as the liquid manure contains a large amount of volatile ammonia, the gutters of the stable should drain readily into a hermetically sealed tank in which alone the urine can be economically stored. The solid manure should be kept in a covered yard, unless you can pursue the ideal practice of distributing it on the land each day and ploughing it in as soon as possible. In this way the maximum yield is obtained, but manure kept in a covered place is in its turn twice as valuable as that left in the open.

FEEDING THE CATTLE

General Rules

THE question of feeding depends a great deal on what your cows produce, for it is obviously no use keeping a cow that costs more to feed than she pays you back in milk. At the same time, it does not pay to starve your cow. The tendency of the English farmer is to give too much concentrated food, regardless of whether the cows are heavy or light milkers. What the cow needs is bulk. Calculate it all out carefully and weigh the milk daily to make sure you are getting a profit.

Avoid the bad habit of feeding while

milking. Cattle should be fed immediately after milking, both morning and evening. After giving soft food, leave an armful of hay in the food box and see that there is always a lump of coarse salt for them to lick to stimulate their thirst. Do not leave either food or water standing in the stable.

Remember that you cannot feed fats. The quality of the milk depends upon the strain and breeding of the cow, though the milk may be richer for a short time before calving.

The average good milking cow should consume daily 6 lbs. of food, exclusive of hay and grass. Reckon roughly 6 lbs. of concentrated food a day for the cow giving 6,000 lbs. (600 gallons) of milk a year, and 8 lbs. for the cow giving 8,000 lbs. A good ration consists of 2 lbs. of gluten meal, which can be bought from any starch factory, 2 lbs. of bran, and 2 lbs. of ground oats. Add straw or finely cut hay to increase the bulk. Mix thoroughly and scald with boiling water.

Another excellent ration, as used on Mr. Christopher Turnor's Danish farm in Lincolnshire, is the following :—

> 60 to 80 lbs. of mangolds per day (uncut). 14 or 15 lbs. of oat straw per day (uncut). An average of 5 lbs. of cake per day.

The cakes are varied according to price, and a very heavy milker may get up to 8 lbs of cake. In the summer he gives about 1 cwt. of lucerne or red clover, and one or two lbs. of cake.

When cattle are kept entirely indoors, alfalfa and silage fed in the right proportion make a well-balanced ration, and cows fed entirely upon them will do well. It is better, however, as a rule to give some grain as well, especially to cows that are milking well. The idea that cows *must* have hay is entirely erroneous.

Give about 30 lbs. of silage daily to each animal, and all the alfalfa she will consume. Supplement this with ground corn and bran in the proportion of 2 to 1, and feed about a pound of this mixture for every 3½ to 4 lb. of milk produced.

Experiments have shown that bran is about equal to oats for milk production, and it is certainly more economical. Feed it dry, as the salivary glands are then more stimulated than by wet feed.

In buying gluten meal or corn meal buy only what you need at a time, as it gets weevils in it quickly. These are very bad for the cattle, as they get into the windpipes and make them cough. Much coughing among cattle is often a sign of dust or weevils in the wind pipes, rather than tuberculosis. If weevils should get in your meal do not throw it away but mix it with the chicken food or leave it in the hoppers for the hens to pick at. They like weevils, raw or cooked.

Feed grain ground rather than whole, as the latter passes through the cow and is wasted, unless the chicken scratch for it in the manure.

Cows that are out of sorts or freshening may be given a warm wet mash.

Turnips should be given principally to heifers or dry cows, but if you are obliged to give them to milkers, feed directly after milking with a few only, and this will not flavour the milk. Mangolds, however, do not have this effect, especially if given after milking, and in any case they are far more profitable to grow.

Cows are also very fond of potatoes, which contain a great deal of starch and have much the same result as gluten meal. In England we import 18,000,000 lbs. of maize a year where we might easily grow 18,000,000 lbs. of potatoes as fodder for cows. These should be dried. A plant for the purpose costs about £40. These, with many other significant figures, are given by Mr. Christopher Turnor in his recently published book *Our Food Supply: its Perils and Remedies*, a practical and suggestive little volume that deserve the widest attention.

Pasture Land

The quality of your pasture land will determine very largely the question of which breed of cattle you should keep. Certain kinds, such as the Kerry, do well on rough grazing; others again require richer food. Well drained land is always desirable, with a few trees in or around it to provide shade and shelter. Yew trees are poisonous to cattle, and I have heard that sprouted acorns have the same disastrous effect.

Soiling Crops

Soiling means cutting green crops and feeding them in a different place from where they were grown. It is generally practised to supplement pasture and makes it possible to support one cow throughout the year on one acre of land, as an acre of soiling crops will feed three or even six times the amount of stock that an acre of pasture land will.

A variety in the cow's feed tends to increase the supply of milk, so that even when pasture is plentiful it often pays to make a change. Soiling is, however, invaluable when the pasture is suffering from drought or has run short for any reason. The cows are kept up to their usual flow of milk, and the growing of the crops should not entail any undue expenditure of time or labour.

In feeding, make the change gradually from one soiling crop to another, giving a diminishing amount of the old crop and supplementing it with an increasing amount of the new. Very sudden changes in feeding are dangerous. Guard against giving too much green feed until the cows are accustomed to it.

The best crop for soiling will depend very largely upon soil and climatic conditions. A dependable list, however, is the following: rye, alfalfa, clover, peas and oats, corn or maize, soy beans, millet and corn silage.

Rye

Rye should be sown about the middle of September, so as to be available in the early spring before the richer green feeds are ready. It is succulent and much relished by the cows, but is not very rich in digestible nutrients. It may be pastured to save the trouble of cutting and feeding, if so desired. Give dry roughage and concentrates as well to secure the best results.

When it becomes coarse and woody, plough it under as a green manure crop and sow maize, millet or soy beans.

Rye, tares or vetches and Italian rye grass all sown together make another good fodder crop.

Alfalfa or Lucerne

Alfalfa or Lucerne clover is a perennial and very valuable soiling crop, specially rich in protein. It is most palatable to the cows and therefore assists greatly in the production both of milk and beef. Some soils have to be inoculated before alfalfa will grow upon them, but in my own experience I found it more difficult to kill than to make grow. It does well on high, well-drained land, and on poor clay. A rich clay soil over gravel or limestone is ideal.

Sour soil should be tested with litmus paper and lime applied in the early spring. Allow two tons to the acre on ploughed land, and harrow it in. One ton of ground lime, followed up the next year with basic, does well in England. Inoculate by bringing soil from a sweet clover patch, for the bacteria that live on the roots of clover are the same as those that live on alfalfa. It takes 500 lbs. of inoculated soil to cover an acre. Spread it on a cloudy day and harrow it in at once, as the bacteria cannot live in the sunlight.

The amount of seed needed per acre varies again according to the soil. Some farmers sow 28 lb. to the acre where others sow 10 or 15. Sometimes in starting alfalfa it is advisable to grow a nurse crop with it, say three pecks of barley per acre. Alfalfa does not spread very much at the bottom, so that it is apt in a few years to get overgrown with weeds. It is therefore well to start it on land in fine tilth, say after potatoes or roots that have been well manured and kept free from weeds. Any tall grasses, such as cocksfoot, rye grass, timothy and meadow fescue, sown with alfalfa, are less likely to smother it than grasses of a close and creeping habit. It does not attain its full growth in England until its third season, but under favourable conditions it will last for five or ten years, and when ploughed up will be found to have enriched the soil with a great deal of nitrogen.

Alfalfa should be cut just before the flowers open. The older the plant the more fibrous it becomes and difficult to digest. Early cutting also means a better aftermath. Given a good season, it should furnish three or four cuttings. In Canada you can only count on three. This means an enormous amount of fodder, sometimes as much as twenty tons per acre. Do not leave it to get scorched on the ground, but cure it gradually in cocks. The great point is to preserve the leaves, which are apt to break off if dried too quickly. Green alfalfa that heats in the mow may become brown and somewhat charred, but stock really seem to prefer it in this well-cured condition. It is partly cooked by the heat it generates, is richer in protein and probably more digestible. Green alfalfa is moist cake. Feed it sparingly at first, and if freshly cut, let it wilt a little; see it is not wet, or scours may result. Wet alfalfa, like very wet grass, is inclined to blow the cows.

One ton of alfalfa hay equals in food value as much as 60 bushels of oats. Many farmers in England include it in their ordinary mixtures of grasses and clovers for pasture land, but it has yet to take the place it deserves as one of the most productive and nutritive crops for green forage or hay.

Clover

Clover is, of course, closely related to alfalfa, but is smaller and somewhat closer in growth and does not live so long. In England it is grown chiefly with grass, but the mammoth red clover is a good variety for soiling.

Peas and Oats

Field peas and oats form a well-balanced ration. Till thoroughly and manure the soil well. Sow one bushel of peas per acre, and cover them to a depth of three inches. After a week or ten days, when the peas have sprouted but before they have appeared above the surface, sow one and a half bushels of oats per acre and harrow them in. The oats will keep the peas up off the ground. If the entire crop is not used for soiling, it can easily be cured for winter roughage. Mr. Christopher Turnor tells me that he sows both together, and often adds barley as well.

Indian Corn

Indian corn or maize does not ripen in England, and only grows south of London, but is most valuable for stock, and, grown under favourable conditions, yields more tons of green or dry roughage per acre than any other crop (often as many as thirty tons), and is most useful for silage. A small variety that matures quickly should be sown as early as possible, and rather more thickly than it is sown in hotter climates when the grain is the crop in view. It is richest in nutrients when the ears are fully formed, and, if fed earlier, clover and alfalfa should be given as well.

Soy Beans

Soy beans unfortunately have not as yet succeeded in England, but are used a great deal in America. They contain a great deal of protein and, where other leguminous crops are lacking, form a valuable addition to the ration. They should be drilled in rows, using about a third of a bushel of seed per acre, and be kept free from weeds. They will not germinate in a cold wet soil. Pastures are shortest in August and September, and it is then that soy beans and corn in the ration should be used to keep the cows up to their full milk flow. Do not let the beans become too ripe and woody before using, or the cows will waste a large proportion of the plant.

Millet

Millet grows quickly and makes a good quality of hay. It can be used as a late soiling crop, sowing it in July broadcast on a well-prepared seed-bed and harrowing it in. This again is not a great success in England.

Ensilage

Ensilage is the cheapest winter food and ensures a good supply of milk. It consists of all the odds and ends of hay, corn-stalks, turnips and mangolds, well chopped and kept in an airtight bin under continual pressure until fermentation sets in. This should be made every year towards the end of August. A little molasses greatly improves the flavour, taking off the slight bitterness induced by the fermentation. Silage takes two and a half times less space than hay.

If ensilage is, however, not available in winter for cattle, a good feed can be made by mixing equal parts of chopped hay and straw, with or without corn, or maize stalks in a large, clean, new garbage can or dust-bin, till it is, say, half full; then have the other half filled with a mixture of the following rations:—two buckets bran, half a bucket of corn meal, half a bucket of oats, half a cup of coarse salt, one bucket of gluten meal (which is the refuse from a starch factory) or oil meal. Gluten meal is the best for increasing the milk flow.

Mix all this thoroughly with your arms or a pitchfork, and pour over it scalding water, a little at a time. Stir again and repeat operations until it is all wet, but not sloppy. Put on a tight-fitting cover and let this soak and swell for twenty-four hours before using, or as much longer as you like. A few beets, dried corn stalks or mangolds chopped also improve it, but if space must be economized these had better be given separately. The cattle will eat and relish a bucket full of this mixture twice a day. If you have not a stove to heat it on, add a little boiling water in the bucket, enough to warm without making it too sloppy. This is a wonderful winter food for cows that are in milk, but they must have dry hay as well. Cows not in milk should only be fed with dry food, but remember always that it does not pay to starve your cows while dry if you want good calves. If your calf is well nourished before it is born, it not only fattens faster but grows faster and generally turns out a better milker. It pays better to keep a few good cattle well than to have a herd that are half starved.

MILKING

ON the ideal farm the milking is done in a separate milking shed instead of in the stable where the cows are housed. This is a cleaner and more sanitary arrangement and makes for the more efficient handling of the milk.

It is most important to milk at regular hours, making the intervals between the milking as equal as possible.

I always advise milking three times a day for the first few months of heavy lactation. I have heard people sniff at this idea, saying that it is difficult enough to get men to milk twice a day, let alone three times, but in point of view of economy it pays far better to have only two or three cows to feed and clean and take up stable room that give you the milk of six poor cows, than to keep the six poor cows, fooling yourself that because they take a short time to milk there is any profit in them. I doubt if the average cow, belonging to the average farmer in England, gives over 3,000 lbs. of milk a year, that is, 300 gallons. This may pay for the food it consumes, but does not pay for the labour expended upon it, and therefore the average cow at the present price of milk is kept at a dead loss to the farmer. 4,000 lbs. will pay people who keep the cow themselves without paying for the labour of looking after it, but if you have to pay labour there is no profit in a cow that does not give 5,000 lbs. a year. It is surely better then to breed cattle calculated to give you 6,000, 7,000 and even more pounds a year. There are plenty such to be had, and it is important to breed from these good milkers with a carefully kept record rather than from stock that are eating up your profits.

If your milk is weighed at each milking and the record carefully marked down, you will notice how many pounds of milk a day are lost by careless milking, bad feeding, cold or fright, and you will be surprised to see how the milk flow is augmented by considerate care and attention. Indeed, the mental condition of a cow in milk seems to me as important as the physical. A mother or wet nurse suckling a child should be kept free, not only from chills, draughts and over-heating, but from fright or excitement of any kind. These are not only bad for the woman producing the milk, but extremely injurious to the baby drinking it, making the child fretful, peevish, feverish and nervous, in short duplicating all the sensations. Yet we allow cattle to be beaten with sticks, yelled at and generally bewildered as they are driven to and from pasture, and are surprised that so many babies fed on their milk scream and yell and are nervous and delicate.

Do not allow people who are not needed to stand around in a cowshed or milking house. Talking, noise, or the mere presence of a stranger makes many cows hold back their milk. I have known a cow give 5 or 8 lbs. of milk less at a time because a strange hand was milking her, or because a stranger was talking to the person milking her.

In this connexion I may also be allowed to say that I have always believed the morning's milk, drawn after the cow has had a good night's rest, to be the most valuable for babies and invalids. It would seem to contain a special virtue and may be compared with the sound judgment of one who has slept over a thing. The morning milk alone is used in making the famous Oka cheese at the Trappist Monastery at Oka; P.Q., Canada, and this fact is all the public can learn of its manufacture, for the secret is entrusted to but two of the many hundred brothers there.

The utmost attention to cleanliness is needed in the person who milks the cow as well as in the dairyman. But cleanliness is very difficult to teach to people who do not appreciate its importance, and unless the desire of being clean is there it is a waste of time to instruct them in dairying or the care of cattle. They should be clean and healthy in their persons as their breath may affect the milk, and they should milk with dry hands on dry teats, washing the hands thoroughly with soap and water between milking each cow, so as to run no risk of spreading a disease of the udder. Do not permit the dirty habit of spraying a little milk on the fingers because it makes the milking easier. Every one knows that milk has a wonderfully cleansing power whether applied to the complexion or to ink spots on table linen, and the milk rubbed on the hands and the udder will draw out any dirt there may be upon them. This will not improve the colour of the milk and is hardly pleasant to think about.

Milkers should be dressed in washable jean or duck suits, preferably white or some light colour. A two-piece suit for a man should have the pants broad enough to slip on easily over the shoes, with a belt and an opening at each side instead of in the front. The shirt should be shorter in the sleeves and bigger across the chest and back than an ordinary one. Women should wear an overall with a loose belt, opening at the throat and fairly short in the sleeves. Their heads should be tied up with a clean washable turban or close-fitting cap, so that nothing from their hair can drop into the milk and nothing from the cow's body be rubbed into their hair, as many milkers have the habit of resting their heads against the cow's side.

Clean clothes are, however, useless unless other precautions are taken too. I have watched many men, dressed in immaculate white in fancy stables, milk a dozen cows without washing their hands or wiping off the cows' udders with a clean damp cloth, only spreading a little fresh straw upon every sort of filth on the floor.

As to Pails

I personally preferred the Danish milking pails which have a wide top and are soldered in such a way that there is no sharp angle at the bottom. They are therefore most easy to keep clean, as there is no place inside or out where the stale milk can lodge or breed bacteria. Many people advocate the use of small-topped pails so as to lessen the danger of dust and dirt getting into the milk. This is in itself desirable, but unless your milker is an expert it is also probable that much of the milk will be lost by squirting in different directions. Avoid the bad habit of feeding the cow while milking. She must attend strictly to the business in hand.

The teats should be squeezed, not pulled, except at the last, when stripping the cow. It is then that she yields her richest milk, and therefore in careless milking the best part is left behind.

The theory that the richness of the milk is affected by the food has been exploded. The quantity of milk is affected, but not the quality. This depends on the blood and breeding of the cow, and very often the heaviest milkers give a poorer quality milk than cows bred for producing butter fat. You can starve and neglect a Jersey or a Guernsey most shamefully, but you cannot prevent whatever milk she gives you from being rich. The cream in the milk will also be thicker in warmer weather and it will vary according to the period of the cow's lactation. It may be richer for a short time before the cow calves.

As soon as a cow has been milked, weigh the pail and enter the amount upon the record sheet, subtracting the weight of the pail. Then empty the milk into a big can outside the stable. This can should have its top covered with a layer of cotton wool between two thicknesses of cheesecloth tied firmly round the tin but sagging in the middle. This acts so thoroughly as a strainer that any dust, hair or dirt is prevented from getting into the milk, and any ropy or bloody milk, or any such sign of garget is detected. Cover the can until a fresh pail of milk is poured in, and when the milking is finished remove it to the cool dairy and pour it, while still warm, into shallow pans. In this way the risk of extra bacteria is avoided.

THE MILK RECORD

THE chief reason for keeping a milk record is that the value of a dairy cow is determined by the number of pounds of milk she yields in a year. Some cattle give a great deal of milk in a few months and then their flow dwindles down to very little indeed before calving, in which case it pays best to dry them off. Other cows give less milk at a time, but are more persistent. The record will tell you just what they are worth. It is just like the egg-laying record of a trap-nested hen—useless unless it is kept up all the year round.

THE DAIRY

KEEP the whole dairy, like an operating theatre, as scrupulously clean and free from outside bacteria as possible. whitewash the ceiling and walls, with the least touch of carbolic in the lime-wash, two or three times a year, and do not put the milk in the room again for two or three days after this is done, as milk absorbs every odour and the poison will be transmitted to the person who drinks it.

No dust or cobwebs must ever be allowed to appear. Avoid going into the dairy with dirty shoes or dirty clothes. There should not be a privy or other possible source of contamination within a hundred feet of it, nor should it be in a room that opens into a water-closet.

If you have to use part of the cellar, be sure to have a door to shut out all dust and odours, and at least one window opening into the outer air. In a small dairy, a through draught is invaluable in hot weather, both for the flavour of the milk and for making the cream rise. This can often be arranged for by a ventilator in the door.

Tiled walls and marble slabs are ideal for a dairy if you can afford them, but if the pans have to be kept on wooden shelves, as in many humble dairies they have to be (mine were), scrub them each day with cold water and coarse salt, and scrub the floor—or wash it up, if it is a stone one—with cold water, so that any milk that may have spilt will not turn sour and affect the rest.

Brushes and rags used in washing up the dairy should be washed and dried in the sun.

All milk vessels should be rinsed out with cold water immediately after being emptied. Then use scalding water and air thoroughly, if possible in the sun. If you use hot water before using cold, the tins will be greasy and have an odour which is almost impossible to remove. Do not use soap on these tins and do not dry them inside. Pans, pails and even the churn, should be turned on their sides to drain and air, and the cloth used in washing them should be boiled every two or three days and washed out daily.

Do not use the tins for any other purpose than keeping milk in them, however much you may be tempted to use them in the kitchen, and do not let the calves drink direct from the milking pails.

In handling large quantities of milk, do not wash up the utensils in the same room as you handle the milk, on account of the steam.

Remember that all water supplies for dairy use should come from uncontaminated sources. Be as particular about it as your own drinking water. Many people strain all their water through fine muslin before using it for washing and churning butter.

Ice used for cooling purposes must also be clean and uncontaminated.

Milk Fats

Good milk should contain not more than 100,000 bacteria per cubic centimetre and the less the better. It should also contain not less than 3·25 per cent. of butter fat.

Cream should contain certainly not less

than 18 per cent. of butter fat. This is very poor cream and is often made to look thicker by artificial means. A really good cream should test 30 per cent. or 40 per cent. of fat.

Skim milk is useless for human consumption unless it contains at least 8·75 per cent. of milk solids.

If you do not possess a Babcock tester, send samples of your milk at frequent intervals to a testing station.

Whole Milk

Bacteria develop at top speed in warm milk, and for this reason whole milk should never be shipped warm, but poured over one of the many patent devices for chilling milk before it is bottled or sent away in cans. Bring it down to 50° Fahrenheit or lower within two hours of milking and keep it cold until it is delivered to the consumer.

There is generally more profit in selling whole milk or in making Devonshire cream or cheese than there is in butter or raw cream, though if you live far from a station and your means of transport are poor, cream may be more profitable to you than whole milk, as it does not have to be delivered more than two or three times a week and you have the skim milk for your calves and other stock.

Cream

To get the best cream, pour the milk into the pans directly after milking, while it is still very warm, and stand the pans in a place that is cool but not musty or sunny. Milk set in shallow pans will produce more cream than milk set in deep pans. Do not disturb it for at least twelve hours, but, better still, twenty-four. In cool climates if you want to get the best results from cream, leave the pans undisturbed for thirty-six hours. This I usually did in Canada, but it is impossible unless the milk is clean and free from smells and the cattle are milked under the cleanest conditions.

The habit of pushing the cream to one side and scooping the milk out from underneath is apt to stop the cream from rising properly, and to sour the milk sooner than if it is left perfectly still. Because the cream does not rise well on the pans it does not always follow that it is not there. It may be that your room is too cold.

Skim Milk

Milk that has been skimmed by hand is never as thin as separated milk, and is excellent for drinking and cooking. In warm weather, however, it is well to sterilize it as soon as the cream has been taken off, or else place it in a vessel that is used for nothing but milk and let it stew gently for half an hour. This causes the water to evaporate and leaves the milk thicker and better for cooking purposes.

Separated milk, having had the violent motion of the separator, is never the same, whatever you do to it, as, if the separator has been properly run, all the fat has been expelled.

A separator can, however, be regulated to expel varying amounts of butter fat.

Separating Milk

Milk that is to be separated should be warm, at a temperature anywhere between 80° and 100° F.

When you have got the speed up, pour a quart of scalding water through the separator, and then pour in the milk. Keep the bowl full, so that the inflow is even.

After separating run a little skim milk through the separator to clean out any remaining cream and then wash thoroughly, first in cold and then in scalding water, and keep it covered with clean muslin when not in use.

Buttermilk

This is the natural by-product of churning cream or milk into butter. It is very good both for drinking and cooking, and many can digest it who cannot take whole milk. It is also very good for the skin.

Artificial Buttermilk

This I have never made myself, but am told that a product of uniform excellence is obtained after a little practice and experience. It is made from skim milk. As soon as it leaves the separator add whole milk at the rate of one gallon to twenty gallons of skim milk, as this will give approximately the amount of fat that ordinary buttermilk contains. Add enough starter to curdle the milk in about six hours and bring its temperature to 70° F. Reckon about two gallons of starter to twenty of milk. When thoroughly curdled churn the milk for about half an hour, as though you were making butter. This will break up the curd clots and give a smooth, thick liquid, indistinguishable from ordinary good buttermilk. As soon as it leaves the churn, cool it to below 50° F. to prevent any further development of acid and the separation of whey. An ordinary cooler with enlarged holes in the distributing receptacle will answer satisfactorily. When cooled, strain the buttermilk through one thickness of cheesecloth to remove any curd clots, bottle it and place it in a refrigerator until wanted.

Those who deal in artificial buttermilk in large quantities will find it advisable to use bottles that are different either in size, shape or colour from those used for plain milk, as this prevents mistakes in delivery, and also the danger of curdling fresh milk, as it is very difficult to get the smell of buttermilk entirely out of a bottle.

Pasteurization

New York City has for the past three years carried out a gigantic experiment for infant feeding at its fifty-five municipal milk depôts where babies are fed on pasteurized milk to the number of 18,000 in summer and 16,000 in winter. Records show that these babies have gained weight, kept well and shown no signs of rickets or scurvy. The death-rate among infants during these last three years has been reduced from 125 per 1,000 births to 24 per 1,000, placing New York City ahead of any large city in the world in the reduction of infant mortality. These statistics are given by Dr. Charles E. North in his pamphlet published recently by the New York Milk Committee. I am sure that pasteurized milk is much safer than dirty milk, or milk from sick cattle, but I believe the percentage of deaths would be even fewer if the babies were given the whole clean milk from healthy, happy cattle, and this would save all the labour and expense of pasteurizing. However, until we become more enlightened, pasteurizing is one of our best safeguards, though it should be remembered that milk so treated is robbed of its antiscorbutic qualities, and children fed entirely upon it are liable to bleeding gums and various symptoms of scurvy.

To pasteurize milk, heat it to a temperature of not less than 140° F. for not less than twenty minutes, and for every degree of heat over 140° the length of time taken may be one minute less than twenty. Cool it immediately to 50° F. or less and keep it at or below that temperature.

Pasteurized milk should contain not more than 1,000,000 bacteria per cubic centimetre before treatment and not more than 50,000 when delivered to the consumer.

Sterilized Milk

Sterilizing is an even more drastic process than pasteurizing.

To sterilize milk it should be as fresh as possible, as bacteria in milk develops very quickly. Too much stress cannot be laid on the importance of perfect cleanliness. Rounded bottles are easier to wash; therefore use them. They should be rinsed out in cold water as soon as emptied, and then left to soak in soda and water. Before using, they should be scrubbed with scalding water and a piece of cloth tied on to a stick or wire; do not use brushes. The cloth should always be boiled after using and aired in the sun.

When the bottles are clean, pour the fresh milk in to within an inch of the top; stopper them with antiseptic cotton, then place them in a sterilizer, pan or kettle, containing cold water. Keep them up off the bottom with a piece of wood or with wires from the top. If these precautions are not taken, the bottles will break and the milk be wasted. Bring slowly to the boil, keep it boiling for three-quarters of an hour. Sterilizers can be bought at a small cost, but any well-covered pot, kettle or pan can be used just as well. Do not count the time of cooking from the time the bottles go into the water, but count from the time the water begins to boil and when finished take the kettle off the stove, allowing the bottles to cool gradually in the hot water in which they have been boiled. When thoroughly cold, they can be removed.

Never remove the stopper until the milk is to be used and replace it carefully as long as there is any milk in the bottle.

Starter

Sour milk, specially prepared, is called starter, because it starts the right sort of change in our fresh milk.

To make "starter" for souring cream, put one quart of separated fresh milk in a deep enamel pan. Cool down to 70 degrees. Add one tablespoonful of souring per quart, leave it for twenty-four hours, when it will be thick and smooth, skim the top and throw it away, also the bottom. Use only the middle part for the starter. This operation can be repeated daily for two years.

The advantage of using a starter is that you will then get the utmost quantity of butter from a given amount of cream. This makes the most profitable butter for salting and crocking. Some people claim that the best butter is made from cream that is not quite sour, but it is more extravagant.

To Keep Milk Sweet

I am told that about a spoonful of grated horse-radish will keep a pan full of milk fresh for a couple of days, but I have never tried it. This, however, is quite harmless—which most of the preservatives are not—if you do not object to the flavour.

A small quantity of Devonshire cream may be kept fresh from one meal to another by putting a lump of sugar in it.

Butter

Butter should neither look nor taste like motor grease. Good butter should be firm, waxy in texture and solid, and the smaller the size of the pound pat the better the butter will be, for the butter that bulks large has not had the water and buttermilk properly squeezed out of it. People who are ignorant about butter often think they are economizing by buying the bigger bulk, but as a matter of fact they are being extravagant, since in cooking with poor butter they have to use nearly double the quantity that would have sufficed had they bought good butter containing pure milk fat.

Cheap bad butter is often disguised by being heavily salted and having lard added to it. There are three main factors that affect the gathering of butter: the temperature, the richness of the cream and its ripeness.

The Flavour of Butter

Personally I think nothing equals the flavour of butter made from freshly hand-skimmed cream, not sour, or from separated cream that has been well mixed and frequently stirred while standing twenty-four hours.

It is hard for the novice to understand that the whole flavour of butter and cheese depends upon the bacteria, and that the important thing is to have in the butter either the bacteria that give a good flavour, or no bacteria at all, which is also very good.

Bacteria develop at top speed in warm milk; and again if cream is kept in too cool a place the cheese bacteria will develop instead of the butter bacteria. A cheesy flavour in the butter often causes it to be mistaken for stale butter.

Remember that the air the cows breathe affects the flavour of the butter, and this is one of the many reasons for having the cow stable well ventilated, and for turning the cows out every day, even if only for a quarter of an hour's scamper in the winter, to get their lungs filled with fresh air. The manure heap should not be where they can breathe the tainted air, and all dust and cobwebs should be swept away. Great cleanliness of the cattle and of the hands and person of the milker must be observed. Do not let the milk stand in the stable after milking. Carry it into the dairy, or stand it in the open if you have no dairy, before any bacteria can develop, or dust get into it. The bacteria that develop from dust or manure, fumes of cooking or washing dirty clothes, are not the bacteria calculated to flavour first-class butter.

Chill the milk quickly and stand it in a cool place, or separate while it is still warm. If fresh butter is to be kept a long time before using, make it of pasteurized or scalded cream, and scald the water it is washed with, chilling it before using. This kills the bacteria.

Salted Butter

The following rules for making salted butter are those observed at the Macdonald College, St. Anne de Bellevue, Province of Quebec, Canada.

PREPARATION OF CHURN.

First, put the plug firmly in the churn.

Second, scald the churn with one gallon of scalding water.

Third, rinse with cold water, and leave it standing in the churn with the lid on.

In summer use no scalding water. Rinse with cold water instead, then scrub with salt and rinse again with cold water.

PREPARATION OF WORKER.

First, scald the worker thoroughly and all the appliances pertaining to it.

Second, rinse well with cold water.

Third, brush carefully with salt.

Fourth, cover with damp muslin to keep the dust off.

Preparation of Cream

See that the cream is in a well ripened condition or else there will be too much buttermilk left over, which is wasteful, and your butter will take much longer to come. Collect all that you mean to churn in one vessel, stirring in thoroughly each new lot of cream. It should be mixed to stand twenty-four hours before churning, but if it stands too long, the butter made from it will have a bitter flavour. Churn thin cream or fresh cream at two degrees higher temperature than thick cream or sour cream. To get cream a little warmer or cooler just before churning, add water of a suitable temperature.

To thin cream, add one pint of water per gallon, or one part to eight; and to thick cream, add two pints per gallon, or one part to four.

Some people think that adding water instead of heating or cooling the cream itself to the desired temperature makes the butter oily instead of waxy and firm. This is a matter of opinion.

CHURNING TEMPERATURE.

Cream in summer 50 to 58 degrees Fahrenheit.

Cream in winter 58 to 64 degrees Fahrenheit.

Breaking water 10 degrees cooler than cream.

Washing water 8 degrees cooler than cream.

Brining water 10 degrees cooler than cream.

Churning

1. Give the churn a few turns. Take the temperature and draw off the water

2. Strain the cream into the churn through a straining cloth.

3. Take the temperature. Screw on the lid firmly.

4. Turn and ventilate the contents of churn every few turns until gas ceases to escape.

5. Turn steadily until the glass on the top of the churn begins to clear, and pin-heads of butter appear on the lid.

6. Add a pint of breaking water per gallon of cream. With thin cream in cold weather, no breaking water need be added.

7. Churn until the grains are the size of wheat.

8. Drain off the buttermilk.

9. Wash with the same quantity of water there was originally of cream.

10. Brine in an equal quantity of water to which salt has been added at the rate of one to two pounds per gallon.

Working Butter

1. Run cold water over the worker to wash off the salt.

2. Lift the butter from the churn with a scoop into the sieve and transfer it to the worker.

3. Draw off the brine and rinse the churn until every particle of butter is obtained. Replace the plug and lid.

4. Work the butter with steady even pressure until it is fairly well consolidated.

5. Weigh the butter and add salt at the rate of half to one ounce per pound.

6. Work the butter until salt is well mixed and all moisture is expelled.

7. Weigh the butter and make into bricks.

Avoid using ice to work your butter with in very hot weather. It is better to make the butter early in the morning or in the evening, or, if necessary, to ice the water used to wash it, removing the ice. Ice has the effect of making the butter get very soft as soon as the ice is removed, instead of remaining firm and waxy as first-class butter should be.

Washing Up

1. Wash the churn, worker, cloths, pails and all appliances in warm water, but not boiling.

2. Scald with scalding hot water and dry. (Some say do not dry.)

3. Polish all metal parts and oil the wheels and screws.

4. To polish milk tins, rub on a little whiting powder with a dry rag instead of using metal polish. It is cheaper and better.

To Keep Butter in Hot Weather

If you have neither an ice-box nor a cool cellar in which to keep your butter firm and waxy in hot weather, place it in a bowl of cold water and cover the sides and top of the bowl with a wet cloth. Another way of obtaining evaporation's artful aid is to take a clean new plant pot and invert it in an equally clean saucer. Place the butter under the pot and pour cold water into the saucer. The porous nature of the pot will ensure its keeping moist and cool.

To Colour Butter

For colouring butter, Annatto is very good. It is made with oil and can be had from any good dairy firm in England, or the Canadian Dairy Supply Co., Youville Place, Montreal.

Keeping Butter

The following recipe for salting winter butter comes from the Canadian Dairy Supply Co., Youville Place, Montreal.

Mix together one gallon of water, one quart of salt for brine and one ounce (a tablespoonful) of formaldehyde. Soak your oiled paper in this before wrapping up the butter. It will keep out mould and odours.

Keep the butter at an even temperature, whether frozen or merely cold. Never stand the butter crocks flat on the floor, but raise them on blocks of wood so that the air can circulate underneath as well as around the sides and over the top.

Preserving Brine for Butter

Wrap each roll of butter in a clean muslin cloth, tie it up with string, make a brine of three gallons of water and enough salt to bear up a fresh egg, always remembering that a fresh egg is heavier than a stale one. Add half a teacupful of pure white sugar, and one tablespoonful of saltpetre, boil the brine, and when cold strain it carefully, pour it over your rolls of butter, just covering them completely. This will exclude all the air. Place a weight over all to keep the rolls under the brine.

Emergency Butter

If you want to make some butter quickly after the cow is milked, strain the milk into clean pans and set over a moderate fire until it comes to a scald, but do not let it boil; then set aside until cold and skim off the cream. This milk is delicious to use, as it is merely pasteurized. When you have got enough cream, put it into a clean earthenware basin and beat with a wooden spoon until the butter is formed. It will come very quickly after this treatment. Lift it out from the milk and drop it into a bowl containing as much cold water as there was originally of cream; work all milk out of it and then drain off the water. Work into the butter a small teaspoonful of fine white sugar, and a small tablespoonful of fine salt; sugar, as well as salt, is a great preservative. Make the butter into a roll and cover with a bit of muslin. Keep in a cool place away from fruit, fish, meat or cheese.

Streaked Butter

This is often due to the imperfect distribution of salt. Salt deepens the colour, but it is practically impossible to apply it evenly, and the even mixing is done in the working. It is a fine point in butter making to know when it is sufficiently worked. If under-worked, it is streaky, or contains too much brine, and if over-worked the grain is spoilt. Over-working, however, is one of the things the beginner is cautioned against, and that is why it is usually the beginner who is responsible for the streaked butter.

You should be able to fold a thin wafer of perfectly worked butter nearly back upon itself without breaking, and when broken its appearance should be distinctly granular. Artificial colouring has nothing to do with streaky butter.

To Glaze Butter

Make the glaze by mixing white powdered sugar with hot water, and while warm apply it with a very soft brush to your butter mould. The heat causes the syrup to melt slightly into the butter and when cold a perfect glaze is accomplished. This excludes all air and therefore preserves the taste of the butter.

Devonshire Cream

Take the fresh cow's milk and set it in a pan (or pans) to cool for twelve hours; then place the pans carefully on the stove over a slow fire, heating gradually until the milk assumes a crinkly appearance. A fair-sized pan should crinkle in about twenty minutes. Now stand the pans in a cool place again (or in water) for twelve further hours, when the milk is ready to be skimmed.

Making Devonshire cream is more profitable than butter, as all the milk is delicious, and particularly good for milk puddings or coffee.

Junket or Slip

Make moderately warm a quart of milk, then stir into it one large spoonful of the preparation called rennet. Set this to one side in a cool place; when cold it will be still like jelly.

Make it only a few hours before it is to be used, otherwise it is inclined to be tough and watery. In summer always set the dish on ice after it has jellied; dust over with grated nutmeg and serve with powdered sugar and cream. This is also delicious served with fresh or stewed fruits.

American readers will note that slip is bonny-clabber without the acidity.

Curds and Cream

It takes a gallon of milk to make a moderate dish of curd. Allow one spoonful of rennet to each quart of milk, and when it has become curd, tie it loosely in a thin cloth and hang it to drain; do not wring or press the cloth. When drained, put the curd into the bowl and set in a cool place, in cool water, keeping this water constantly changed. If you use a refrigerator, it saves the trouble of changing the water. In serving, if there is any whey left in the bowl, ladle it out without pressing the curd. Lay the curd on a deep dish, pouring fresh cream over it; have powdered nutmeg on top and pass sugar and cream with it. You can buy prepared rennet at any chemist's or grocer's; be sure to get the very best quality. I personally get the Danish if I can.

Cheese

The milk produced in Great Britain and Ireland amounts roughly to 1,650,000,000 gallons a year. Of this 600,000,000 gallons are consumed as whole milk; 900,000,000 are made into butter, largely of inferior grades, and only 150,000,000 gallons are made into cheese. Cheese, however, is one of the most valuable of all articles of food, and is nearly twice as profitable as butter.

The "Little Lincoln" Cheese

This cheese needs very little in the way of appliances, and the proper plant only costs £1.

Pour new milk into a double saucepan, or into any pan that fits conveniently into another, so that the temperature is regulated by the heat of the water in the outer vessel. In this case the temperature should be 84° F., and rennet should be added in the proportion of half a teaspoonful to each gallon of milk. Let this stand for an hour and a half, then cut the curd into cubes, and heat to 88°, stirring for half an hour. Leave it again for half an hour, then draw off the whey and collect the curd in a cheese cloth. Cut and turn the curd every half-hour, and after the third time test it on a hot iron. If it draws in fine threads break it by hand into small pieces and add an ounce of salt to every 4 lb. of curd. Press into small tins, allowing 1½ lb. of curd for each cheese, and put a pound pressure on each for one night. Turn the cheeses daily till they slip out of the tin. Then scrape the surface smooth and pin on a bandage. Turn daily, and when the bandage is dry remove it. Continue to turn daily, and when the whole surface seems dry brush the cheeses all over with flour paste, put muslin caps on the top and bottom and a muslin bandage around. These cheeses develop more quickly in warm weather than in cold, and are most satisfactory when a starter is used. They are ready for use in three weeks, but may be kept longer without fear of deterioration.

Cottage Cheese

Take one quart of soured milk and heat it to 100 degrees. Line your strainer with clean cheese cloth, and pour this heated sour milk into it. Then pour over a quart of hot water; as soon as the water has drained through, pour over another quart, then repeat a third time.

Gather the cheese cloth tightly around the curd, and let it hang until the curd is free from the whey. Moisten with melted butter and heavy cream, adding salt to taste.

You may also make this cheese of sweet milk by forming the curd with prepared rennet.

New Jersey Cream Cheese

Scald the quantity of milk desired, and allow it partially to cool; then add prepared rennet according to the directions on the bottles. When the curd is formed, ladle it out without breaking it on to a thin cloth stretched between two people. Dash a ladle full of water over each ladleful of curd. This will separate the curd, after which hang it up so that the water may be drained off, and later put it under a light press for an hour. A strong thread should be used for cutting the curd into small pieces. Lay a cloth between every two and press for an hour. When you take them out, rub them with fine salt, then let them lie on the board for an hour, and wash them in cold water. Let them lie to drain, and in a day or two the skin will look dry. Use sweet grass under them and over them for ripening.

THE COW'S COMPLAINTS

Abortion

ABORTION is not a disease in itself, but is a symptom of several diseases and conditions, and is contagious. If a cow has aborted, be sure and burn all her bedding and whitewash and disinfect the stall, letting it air thoroughly before any other cows use it.

Syringe out her vagina with two gallons of lukewarm water containing 1 per cent. coal-tar disinfectant daily for ten days, and then twice a week for a month and again daily for three weeks just before breeding. A cow given to abortion might also have this further preventative treatment. Dilute two drachms or sixty drops of crude carbolic acid with water and mix it in the soft feed, or sprinkle it on the silage every other night throughout the period of pregnancy.

A bull serving a cow given to abortion is likely to become contaminated and to spread the complaint among the other animals. The safest plan is to syringe the sheathe of the bull before and after service, using half a gallon of lukewarm water containing 1 per cent. of coal-tar disinfectant, with a fountain syringe.

Anthrax

This virulent contagious disease shows itself suddenly and is often quickly fatal. A cow attacked with it will stand very still, with staring eyes, away from the rest of the herd. It shivers frequently and declines food. A little blood may ooze from its nostrils or its vent while it is still alive, and will almost certainly do so after death. At the same time, there is considerable difficulty in recognizing the symptoms, and an expert opinion should be called in, especially before disposing of the carcase of any cow that has died suddenly and unaccountably. You are required by law in England to notify every case of anthrax or suspected anthrax to the police, and the local authority will make provision for the disposal of the carcase and the disinfection of your premises. The blood of such an animal contains large numbers of the anthrax bacilli and is most dangerous. It should therefore not be allowed to escape from the body, or, if escaping, should be destroyed with a strong solution of carbolic acid. It is most essential that the carcase should not be cut or opened until the proper examination is made by the authorities, and therefore, wherever the slightest suspicion of anthrax exists, a sick animal should not be killed, but isolated most carefully. The most stringent precautions must be taken to prevent the spread of the disease. Ignorance and carelessness alone seem responsible for its appearance.

Barrenness

Barrenness is a common result of abortion infection. If the treatment recommended for aborting cows has not been followed, it is a good plan to inject into the vagina one tablespoonful of phosphate of soda dissolved in two quarts of lukewarm water an hour or so before service. The phosphate of soda neutralizes the acid conditions in the vagina of some cows, and has proved better than bicarbonate of soda, which some people have advocated. There is no specific remedy known for this complaint, but the phosphate has had remarkable effect in many cases.

Calf Scours

Calf scours are caused by wet, dirty bedding, by giving the calves milk that is too cold, by overfeeding, or by giving too much alfalfa hay when they are not used to it. To cure it, put a little lime water in the milk to sweeten the calf's stomach.

Cracked and Sore Teats

Apply iodine ointment twice a week, and twice daily apply a 3 per cent. solution of carbolic acid and glycerine. Warm castor oil rubbed on night and morning is often effective, and sweet oil and lanoline are both good for the mammary organs.

If the sore on the teat shuts off the milk entirely, or squirts it all over the fingers, it may be advisable to dry the cow off and rub the sore with strong iodine ointment. Garget may result from a sore, and in this case the tuberculin test should be applied.

As a preventative of cracks and sores, milk with dry hands and keep the udder really clean.

Diseased Ovaries

If a cow remains constantly in heat for a long time, there is probably some disease of the ovaries or womb. An expert veterinary surgeon may be able to rectify the trouble, but a simple and safe treatment is to inject into the vagina a gallon of lukewarm water, with a teaspoonful of coal-tar disinfectant to each quart. If this fails and the animal is not a very valuable one, the best plan is to sell her to the butcher, for she is a nuisance and a menace to the herd.

Dysentery

In cases of chronic dysentery, the animal becomes very thin, but eats well until it dies. It is often due to a species of tuberculosis in the bowels, and I should certainly not keep an infected animal in my herd, but kill it.

Foot and Mouth Disease

In England this most serious disease must always be reported to the police if you suspect its presence in your herd. Animals affected generally go lame and slaver at the mouth. Blisters appear on the tongue and inside the lips, on the pads of the hoof and at the junction of the skin and the horn, and in a cow the teats are fairly certain to be affected. These blisters are easily broken and the liquid they contain is highly infective. Anything this liquid touches, such as milk, saliva, food, water, litter, dung, hides, boots, hands, and clothes, will also become contaminated, so that immediate isolation and disinfection should be carried out. I have never had any experience of this trouble in my own herd, but am told that the virus can be destroyed by antiseptics. Plenty of fresh air, sunlight, exercise and dry stalls would prevent its ever taking hold. All milk from cows suffering from this disease must be kept separate and must not be sold. Do not even give to your other stock unless it has been well boiled. Animals usually recover from foot and mouth disease, but the loss through depreciation in the value of the cow, or its milk flow, is always considerable. The United States of America have stamped out the complaint, and with proper attention to hygienic measures the same can be done here.

Garget

Garget can be detected by a bloody deposit in the milk, a hard, lumpy feeling in the bag and teats and difficulty in drawing out the milk from the side affected; or by a stringy, thick, white substance found either in the cloth through which you strain your milk, or in the cup of the separator. This complaint frequently accompanies tuberculosis, or it may also be due to sleeping and lying on damp bedding in dirty stables, where the udder becomes chilled and wet, and the cow takes cold in that very delicate and sensitive part. Sometimes it is even caused by a blow as the cattle are driven to and from pasture. A bad case is incurable, but if taken in time and if the cause is not tubercular, the following treatments will prove invaluable. Bathe the udder with hot water and mustard or turpentine, then work in a little camphorated oil, rubbing the udder well between your hands. Use the oil sparingly, as it is inclined to dry the milk. Another method is to bathe the udder with hot water in which a little Poke root has been dropped. This has the advantage of not drying the milk. See that the cow has plenty of thick, dry, warm bedding, and keep the milk very thoroughly drawn away from the infected part.

The milk, cream or butter from cows with garget is inclined to have a slight odour and taste and is unhealthy. I cannot too strongly protest against the pernicious habit of mixing this pus from diseased cattle with a quantity of rich milk, thus making the taste almost unnoticeable until the milk has stood for some time or the cream has been churned into butter. As long as there are thousands of babies drinking milk infected with garget we cannot be surprised at the high percentage of infant mortality.

Gathered Bag

A gathered bag is very painful to a cow, and she does not like having it touched, but it is very dangerous to leave the milk in her. Cover the udder with hot compresses of flannel soaked in hot water and with a dry covering outside. Hold this on with your hands until the best part has soaked in and the dry part outside has absorbed the moisture. Now be very careful she does not catch cold, and have beside you a saucer of sweet oil. Rub this in thoroughly, not only to the swollen, but to the unaffected parts, and draw away the milk, either by hand milking or by an instrument. This treatment is also good for garget, and it is sometimes difficult to distinguish between these different diseases of the bag which are so painful to the poor cow; but they are easily detected by the swelling of the bag or teats, or sometimes by a shiny hard surface or by hard knots and lumps felt in pressing on the bag. The milk sometimes comes out in ropes and strings or in blood and sometimes will not come out at all. The cause may be merely a little inflammation from cold, or it may be garget or tuberculosis, and if not cured in a few weeks is apt never to be curable.

Husk or Hoose

Calves are sometimes bothered with small thread-like worms in the tubes of their lungs which cause a husky bronchial cough. The parasite is probably swallowed in egg form in the food or water, and carried to the lungs in the blood. Wet seasons, low-lying and overstocked land, are favourable to the spread of the disease. In bad cases a veterinary surgeon should be asked to give injections in the windpipe, and contaminated land should be ploughed up and cropped.

The presence of this complaint indicates that there is something radically wrong with the way the calves are being reared. Their sheds should be raised from the ground, their bedding must be thick, dry and warm, they must have a generous diet and plenty of exercise on well-drained land.

Indigestion

Indigestion is sometimes caused by burs in the pasture. If a calf or a cow has colic or indigestion or seems in pain, work the spinal column well between the thumb and middle finger of both hands, pressing and pinching it all the way from between the ears at the back of the brain to the tail. The spine is an important nerve centre, and this treatment will force the blood back to its normal route and pressure. It should be kept up for about half an hour. I have in this way cured a calf laid up from drinking green paint and a cow with colic who had eaten too much wet grass and got blown out with wind.

Leaking Milk

It sometimes happens that the muscles closing the teat ducts become weakened, and the milk leaks away. To prevent the leakage, place rubber bands firmly around the teats, taking care not to interfere with the circulation of the blood. Collodion painted on the end of each teat after milking has also proved successful. Either must always be removed before starting to milk. These methods will not cure the trouble, but are effective as long as they are used.

Milk Fever

A cow is far less likely to have milk fever if she is made to take abundant exercise every day and fed on light laxative rations. Do not turn her out in rich pasture if she is near calving. Let the calf suck for a day or two and only strip her on the third day. In cases of fever, the bag becomes swollen, hot and dry, and the udder inflation should be applied.

Milkless Heifer

It sometimes happens that a heifer goes dry directly after calving. Administer strychnine and pilocarpin under the direction of a veterinary surgeon. A few doses will be enough if the treatment is going to prove successful.

Red Urine

This is caused by irritants in the feed, such as fungi or moulds. Keep the cow off the pasture land and feed hay and grain. A drachm of alum and another of dried sulphate of iron mixed in the feed twice daily may check the trouble, but there is no specific remedy.

Retained Afterbirth

Until the afterbirth is expelled, inject into the vagina two gallons of lukewarm water containing a teaspoonful of coal-tar disinfectant to the quart, every six hours after calving. If the afterbirth has not been passed within forty-eight hours, it must be removed by hand.

Cows that have had regular exercise and light, laxative food are not likely to be troubled in this way.

Rheumatism

Rheumatism is very rare among cattle, but tuberculosis very prevalent, and this often makes them lame and stiff. If you suspect rheumatism, however, give some homœopathic tincture of rhustox or homœopathic pills. Put the pills with your fingers on the back of the cow's tongue, holding her head up till she is forced to swallow them dry. Give this twice a day for a week, and see that she has a dry bed to sleep on. If the lameness is not cured by then, have her tested with tuberculin.

Ringworm

A cow that is kept well brushed with its skin in full action is not likely to get ringworm unless it catches it in contact with a dirty animal. It will eat well and milk well, but the hair will come off in patches of varying size, and there is sometimes a slight discoloration of skin. Scrub the spot clean with castile, carbolic or tar soap, and then rub in a little iodine ointment every other day; or rub on wet corrosive sublimate soap once a day for three days, allowing the soap to dry on the part affected. Ringworm is not inherited, but is contagious. The brush used for a cow with ringworm must not be used for other animals. It is cheaper to buy plenty of brushes than to lose your herd.

Self-sucking

A cow that sucks herself should be fitted with a spiked halter or a necklace of sharpened pickets arranged in a similar way.

Swollen Jaws

Swollen jaws may be caused by an abscess. This should be opened and the pus expelled, injecting a disinfectant solution daily as long as necessary. Sometimes a hot compress repeatedly changed and tied on will draw the pus out, but if the trouble is allowed to go too long, it may be incurable.

Tuberculosis

Tuberculosis is especially prevalent among dairy cattle and is very largely due to damp, dirt and darkness and to generations of interbreeding. Direct sunshine and disinfectants will kill the germs, yet it is said that as many as 25 per cent., or one in every four, of cattle kept indoors are tubercular. Now the most general mode of infection is by breathing air laden with the tubercle bacilli. The disease is most contagious and is frequently contracted by human beings through their drinking whole or skimmed milk from cows with tubercular udders. Does this not point again to the need for properly cleaned, ventilated and well-lighted cowsheds, and the isolation or segregation of all sick animals?

A cow with tuberculosis frequently has a short dry cough, its head hangs and there is a pinched look about the face. The muzzle is dry and feverish. There may be anæmia and wasting, and there is sometimes lameness. The bacilli generally lodge first in the lungs and the infected mucus passes to the throat and is either coughed up, or more often swallowed. This means that the bacilli are carried into the intestines and further centres of infection are formed. The udder may become somewhat swollen and hard and the milk stringy or flaky, as in cases of garget.

In all cases of suspected tuberculosis it is well to call in a veterinary surgeon and have the tuberculin test applied. This will be done for a fee of about one guinea. In 1914 there was a Tuberculosis Order requiring every case among cattle to be reported to the local authority, but since the war this order has been suspended. In Canada it is usual to call in a Government inspector to make the test for you at a small expense, and any animal that reacts must be destroyed. Tuberculin, however, while an indication, is not an infallible test, and should not be employed for example when a cow is in calf or for fifteen days after it has calved. Every female animal is inclined to be a little feverish at such a time, and I have known a cow then react to the tuberculin which would not have done so ordinarily. Nor should the test be employed more than once a year.

Should one or more cows in your herd be infected with tuberculosis, it is most important that they should be kept by themselves, if you do not decide to destroy them. All their excretions will be infectious, and in the liquid state may cause direct contamination of food and water, while if left to dry, the dust will permeate the cowshed and be inhaled by all and sundry. Disinfectants should therefore be in daily use. If the sick cow is giving milk, this should not be mixed with the milk from healthy cattle, but be kept apart in separate vessels, and boiled or otherwise sterilized before use. The bacilli are killed by exposure for fifteen minutes to a temperature of 185° Fahrenheit.

Warbles

Warbles are grubs which get under the skin of cattle, forming lumps on the back which are about as big as a shilling, and move when you press them. Squeeze them out by placing the mouth of a quart glass bottle over them and pressing firmly to exclude the air until the grub pops out. Then bathe the places once daily with 1·100 of coal-tar dip until well. This is an unnecessary skin complaint. Keep the cattle clean, giving sun and air, and you will not have the trouble of it.

Warts

To remove large warts from a cow's udder, snip them off with scissors, or tie a fine silk thread around the base to slough them off. Small warts will disappear if rubbed daily with castor oil.

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